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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/585,759	07/12/2006	Takayasu Yamazaki	1560-0462PUS1	7895
2292 7590 02/05/2009 BIRCH STEWART KOLASCH & BIRCH PO BOX 747 FALLS CHURCH, VA 22040-0747				
EXAMINER JOHNSON, MATTHEW A				
ART UNIT 3656		PAPER NUMBER		
NOTIFICATION DATE 02/05/2009		DELIVERY MODE ELECTRONIC		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

# Office Action Summary

**Application No.**

10/585,759

**Applicant(s)**

YAMAZAKI ET AL.

**Examiner**

MATTHEW A. JOHNSON

**Art Unit**

3656

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 12 July 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 5-8 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 5-8 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 July 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☒ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-893)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_
- Paper No(s)/Mail Date 7/12/2006

**DETAILED ACTION**

***Priority***

1. Acknowledgment is made of applicant's claim for foreign priority based on an application filed in Japan on 1/13/2004. It is noted, however, that applicant has not filed a certified copy of the JP2004-006094 application as required by 35 U.S.C. 119(b).

***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 6 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Re claim 6: Regarding the limitation, "a tooth surface modification such that a difference in pressure angle oriented so as to increase a mesh stress with the rack teeth is provided in a direction of the tooth profile" it is unclear what feature Applicant is attempting to claim.

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 5-8, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Namiki et al. (USP-4,382,389) in view of Umeiyama et al. (USP-6,080,199).

Re clm 5: Namiki discloses a rack-and-pinion steering apparatus (Figs. 6 and 7) including pinion teeth (67) provided on a circumferential surface of a pinion shaft (65) and rack teeth (66) provided on an outer surface of a rack shaft (63), meshed with each other substantially without backlash (via 68), so as to transmit rotation of the pinion shaft connected to a steering member (61) to the rack shaft via a mesh portion between the pinion teeth and the rack teeth (Figs. 6 and 7), thus to move the rack shaft in an axial direction thereof at a predetermined stroke ratio for execution of steering operation.

Regarding the limitation, "wherein the pinion teeth and the rack teeth are provided with a module  $m$ , a number of teeth  $z$ , a tooth depth  $h$  and a helix angle  $\beta$  that remain within the following respective ranges, under a condition of a pressure angle  $\alpha$  being within a range of  $24^\circ$  to  $30^\circ$  and the stroke ratio: module  $m$ : 1.8 to 2.0, number of teeth  $z$ : 7 to 13, tooth depth  $h$ :  $2m$  to  $2.5m$ , helix angle  $\beta$ :  $40^\circ$  or smaller " Namiki discloses the claimed invention except for identical ranges for the above values. It would have been obvious to a person having ordinary skill in the art at the time the invention was made to have set values for the gear teeth within the respective ranges, since it has been held that where the general conditions of a claim are disclosed in the

prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Additionally, while Nakimi does indeed disclose a pressure angle  $\alpha$  being within a range of  $24^\circ$  to  $30^\circ$  (C6 L8-13), a number of teeth  $z$ : 7-13 (Fig. 7), and a helix angle  $\beta$ :  $40^\circ$  or smaller (C6 L8-13) and a graph (Fig. 5) showing how to choose optimum values for the dimensions of the rack shaft, Nakimi does not explicitly disclose a module  $m$  of 1.8-2.0, and a tooth depth  $h$  of  $2m$ - $2.5m$ .

Umeyama teaches a gear (see C16, table 2 gear # 1-3) having a module  $m$  of 1.8-2.0, and a tooth depth  $h$  of  $2m$ - $2.5m$  for the purpose of optimizing the gear to reduce transmission error amplitude thus reducing gear noise (C27 L61-64, see also C26 L2-37 explaining optimization of the above parameters).

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to have modified the module  $m$  and tooth depth of the rack and pinion system of Nakimi such that the module  $m$  is 1.8-2.0 and the tooth depth  $h$  is  $2m$ -2.5, as taught by Umeyama, for the purpose of optimizing the gear to reduce transmission error amplitude thus reducing gear noise (C27 L61-64, see also C26 L2-37 explaining optimization of the above parameters).

Re clms 6 and 7: Nakimi in view of Umeyama disclose all of the claimed subject matter as described above.

Nakimi does not disclose the pinion teeth are subjected to a tooth surface modification such that a difference in pressure angle oriented so as to increase a mesh

stress with the rack teeth is provided in a direction of the tooth profile, and that a central portion thereof is formed in a convex shape, and the pinion teeth are subjected to a tooth surface modification of crowning along a tooth trace direction.

Umeyama further teaches pinion teeth that are subjected to a tooth surface modification such that a difference in pressure angle oriented so as to increase a mesh stress with the rack teeth is provided in a direction of the tooth profile, and that a central portion thereof is formed in a convex shape, and the pinion teeth are subjected to a tooth surface modification of crowning along a tooth trace direction (Figs. 19, 26-41, C23 L31-C24 L14), for the purpose of optimizing the gear to reduce transmission error amplitude thus reducing gear noise (C23 L31-41).

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to have modified the tooth surface of the pinion gear of Nakimi such that the pinion teeth are subjected to a tooth surface modification such that a difference in pressure angle oriented so as to increase a mesh stress with the rack teeth is provided in a direction of the tooth profile, and that a central portion thereof is formed in a convex shape, and the pinion teeth are subjected to a tooth surface modification of crowning along a tooth trace direction, as taught by Umeyama, for the purpose of optimizing the gear to reduce transmission error amplitude thus reducing gear noise (C23 L31-41).

6. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Namiki et al. (USP-4,382,389) in view of Umeyama et al. (USP-6,080,199) further in view of Nakatsu et al. (USP-6,834,742).

Re clm 8: Nakimi does not disclose a motor for steering assistance is disposed between the steering member and the pinion shaft, thus to constitute an electric power steering apparatus that transmits the rotational force of the motor to the pinion shaft to assist the steering operation executed according to the rotation of the pinion shaft.

Nakatsu teaches a motor (30) disposed between a steering member (2) and a pinion shaft (6), thus to constitute an electric power steering apparatus that transmits the rotational force of the motor to the pinion shaft to assist the steering operation executed according to the rotation of the pinion shaft, for the purpose of achieving the predictable result of providing a steering assist to the driver.

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to have included in the device of Nakimi in view of Umeyama, a motor for steering assistance is disposed between the steering member and the pinion shaft, thus to constitute an electric power steering apparatus that transmits the rotational force of the motor to the pinion shaft to assist the steering operation executed according to the rotation of the pinion shaft, as taught by Nakatsu, for the purpose of achieving the predictable result of providing a steering assist to the driver.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MATTHEW A. JOHNSON whose telephone number is (571)272-7944. The examiner can normally be reached on Monday - Friday 9:00a.m. - 5:30p.m. EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Ridley can be reached on 571-272-6917. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/MATTHEW A JOHNSON/  
Examiner, Art Unit 3656

/Richard WL Ridley/  
Supervisory Patent Examiner, Art Unit 3656



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